

Application No.: 10/644,255
Response to Office Action of July 26, 2005
Attorney Docket: CULLN-001B

Amendments to the Claims:

1-21 (Canceled)

22. (New) A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy.

23. (New) The process of Claim 22 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

24. (New) The process of Claim 22 wherein said crude oil fraction is a fraction boiling within the diesel range.

25. (New) The process of Claim 24 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

26. (New) The process of Claim 22 wherein said crude oil fraction is a fraction boiling within the gas oil range.

27. (New) The process of Claim 26 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

28. (New) The process of Claim 22 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

29. (New) The process of Claim 22 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

30. (New) The process of Claim 23 further comprising contacting said crude oil fraction with a transition metal catalyst.

31. (New) The process of Claim 30 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

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32. (New) The process of Claim 30 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

33. (New) The process of Claim 30 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

34. (New) The process of Claim 22 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

35. (New) The process of Claim 22 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

36. (New) The process of Claim 22 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

37. (New) The process of Claim 22 performed at a pressure of less than 400 psia.

38. (New) The process of Claim 22 performed at a pressure of less than 50 psia.

39. (New) The process of Claim 22 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

40. (New) A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of an aqueous phase.

41. (New) The process of Claim 40 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

42. (New) The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the diesel range.

43. (New) The process of Claim 42 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

44. (New) The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the gas oil range.

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45. (New) The process of Claim 44 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

46. (New) The process of Claim 40 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

47. (New) The process of Claim 40 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

48. (New) The process of Claim 41 further comprising contacting said crude oil fraction with a transition metal catalyst.

49. (New) The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

50. (New) The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

51. (New) The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

52. (New) The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

53. (New) The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

54. (New) The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

55. (New) The process of Claim 40 performed at a pressure of less than 400 psia.

56. (New) The process of Claim 40 performed at a pressure of less than 50 psia.

57. (New) The process of Claim 40 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

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58. (New) A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of a surface active agent.

59. (New) The process of Claim 58 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

60. (New) The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the diesel range.

61. (New) The process of Claim 60 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

62. (New) The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the gas oil range.

63. (New) The process of Claim 62 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

64. (New) The process of Claim 58 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

65. (New) The process of Claim 58 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

66. (New) The process of Claim 59 further comprising contacting said crude oil fraction with a transition metal catalyst.

67. (New) The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

68. (New) The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

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69. (New) The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

70. (New) The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

71. (New) The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

72. (New) The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

73. (New) The process of Claim 58 performed at a pressure of less than 400 psia.

74. (New) The process of Claim 58 performed at a pressure of less than 50 psia.

75. (New) The process of Claim 58 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

76. (New) A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the absence of an oxidizing agent while exposing said crude oil fraction to sonic energy.

77. (New) The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the diesel range.

78. (New) The process of Claim 77 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

79. (New) The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the gas oil range.

80. (New) The process of Claim 79 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

81. (New) The process of Claim 76 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

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82. (New) The process of Claim 76 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

83. (New) The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

84. (New) The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

85. (New) The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

86. (New) The process of Claim 76 performed at a pressure of less than 400 psia.

87. (New) The process of Claim 76 performed at a pressure of less than 50 psia.

88. (New) The process of Claim 76 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.